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Trade in parts and components across Europe*

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With the rise of global value chains, trade in intermediates now accounts for more than two-thirds of total trade. This column provides evidence that trade in parts and components of capital goods between new and old EU countries is driven by wage differences across countries. It further shows that wage differences play an especially important role in the ex ante investment decision to establish a new production network.

According to IMF statistics, worldwide trade in intermediate goods represents more than two-thirds of total trade (IMF 2013). In this large part of the worldwide exchange, trade in parts and components (of capital goods) forms an important subset. Various studies link trade in intermediate goods to the existence of production networks and global value chains (Coe and Yeung 2015). The basis for such arrangements lies in the fragmentation of production, i.e. the deepening of the division of labour by splitting production into distinct tasks. Fragmentation increases incentives towards specialisation but requires breaking up the geographical concentration of production. Hence, firms specialise within the supply chain, potentially by joining international production networks or even offshoring individual tasks. All this induces increased trade in parts and components, along with other intermediate goods. Fragmentation-induced specialisation within networks has potential benefits, but it also implies costs of coordination such as costs of investment, communication, and two-way trading of intermediate products. Hence, the international scale of production networking should increase with fragmentation, with declining coordination costs, or with the strength of international incentives to specialise.

It has been observed that low-wage-country firms specialise in tasks that tend to be routine, homogeneous, and intensive in low-skilled labour. Case studies indicate that, in general, machine building and capital goods production has experienced the most pronounced international production networking (Kimura et al. 2007 and 2008, IMF 2013). Differences in countries' comparative advantages, including wage differences, are seen as primary suspects to determine specialisation along the international production chain, but the evidence is quite mixed (Görg 2000, Baldone et al. 2001). In our contribution (Frensch et al. 2015), we aspired to provide less ambiguous results that are based on (i) a more refined gravity framework, (ii) more data to reliably distinguish trade flows across Europe, (iii) the use of panel estimation techniques to test our hypotheses, and (iv) a division of trade into flows and margins as in Frensch (2010).

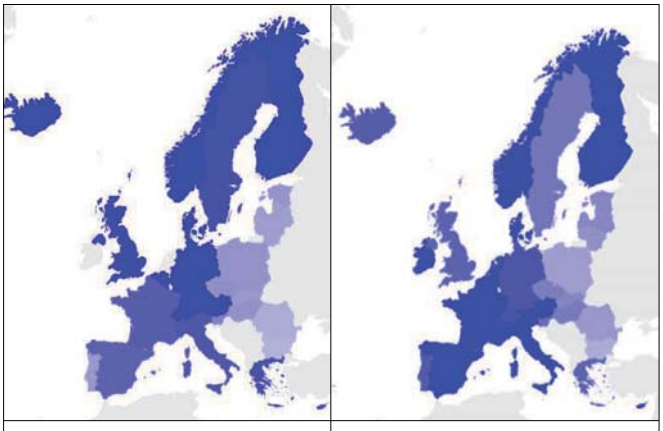
The margins of trade in production networks

The last distinction—the use of margins of trade—is especially important. The extensive margin of trade represents the variety of parts and components traded, while the intensive margin describes how intensively each of the parts and components is traded. The difference in both margins of trade has important implications with respect to production networks. First, changes along the extensive margin of trade translate into the variety of parts and components traded by adding more products to a network. These changes are reactions to the investment decisions of setting up new international capital-good production networks or extending the existing ones; these decisions are made

ex ante. Second, changes along the intensive margin (average traded volume of parts and components) represent responses to ex post decisions on either deepening international production networks or intensifying production and trade within an already established partner-product network.

In our analysis we proceed in two steps. First we build a gravity model compatible with incomplete specialisation following the approach of Haveman and Hummels (2004). The model directly translates into an econometric specification that we estimate in the second step adopting a dynamic panel estimation framework to control for the potential endogeneity of explanatory variables (for technical details, see Frensch et al. 2015). We cover the period 1992–2008. By constraining our sample to 2008, we avoid the noisy impact of the economic crisis from 2009 onward as regular international trade flows were severely affected during the global financial crisis (Chor and Manova 2012). The data on bilateral trade in EU countries were compiled from the UN COMTRADE database; the parts and components of capital goods are defined according to the BEC categorisation of the UN Statistics. The exporter and importer GDP at current prices were obtained from World Development Indicators. The country-specific supply-side differences are proxied by the manufacturing wages obtained from the International Labour Office statistical databases. As a complementary measure we also use GDP per capita. In Figure 1 we show the existing dichotomy of wages across Europe. Darker shades depict higher wages in old EU countries while lighter shades in new EU members exhibit lower wages in general. Differences in capital-labour ratios across Europe provide a similar complementary picture.

Figure 1: Wages and capital-labour ratios across Europe

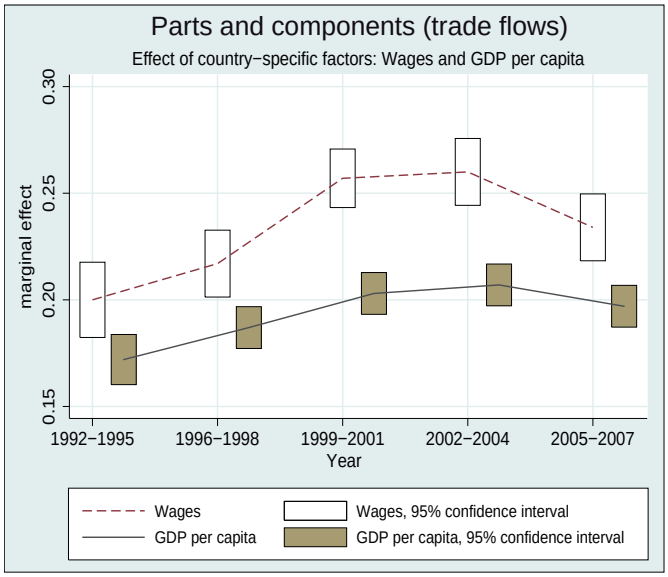


Note: Average wages in manufacturing as of 2008. Local currency data from LABORSTA (International Labor Office statistical databases, http://laborsta.ilo.org/), converted into dollars. The capital-labour ratio is computed from the PWT8.0 as cap/emp, i.e., as capital stock at current PPPs (in millions of 2005 USD) over the number of persons engaged (in millions). Higher wages and higher ratios are indicated by darker shading. Maps were created by a web interface at http://www.openheatmap.com.

What do we find? The following account is based on the detailed results presented in Frensch et al. (2015) and complementary figures are presented below. Based on regression results (not reported here), we demonstrate that larger countries trade more with each other. This is something one would expect, but it is good to have it confirmed empirically. Further, we find no strong evidence that the average bilateral European trade in parts and components is driven by countries' multilateral specialisation incentives. On the other hand, we find that technical progress in terms of declining coordination costs and ongoing fragmentation appears to positively influence trade in parts and components.

Despite the absence of multilateral specialisation incentives driving the average European trade, we do find this evidence between old and new EU countries. In Figure 2 we see that relative supply-side country differences (in terms of wages and GDP per capita) do drive trade in parts and components as the marginal effects between old and new EU members are quite pronounced and follow a similar pattern irrespective of the factor chosen. Consequently, bilateral trade flows in parts and components between old and new EU members appear to be driven by incomplete specialisation motives.

Figure 2: How wages and GDP per capita affect trade in parts and components

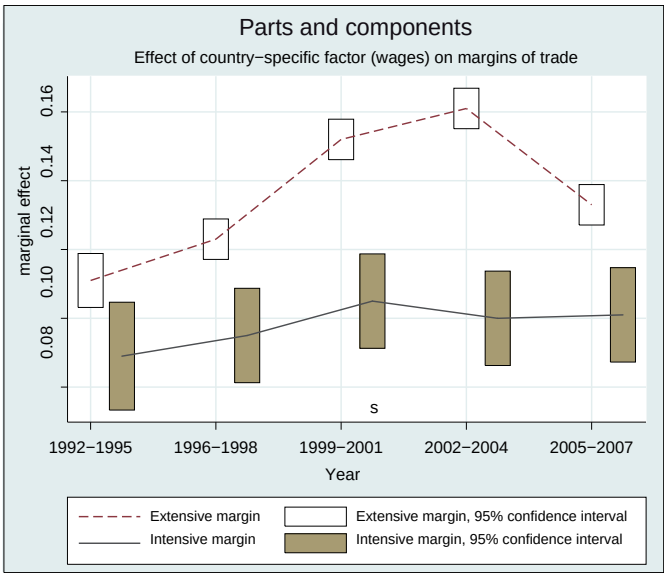


While results on trade flows in parts and components may be taken as evidence for the existence of supply chains in the form of international production networks in the East-West European track, we provide additional insights from the decomposition of the trade data along its two margins. The key observation is derived from a comparison of the results presented in Figure 3. In response to stronger relative supply-side country differences, trade in parts and components across Europe is not realised much along the intensive margin as the marginal effects are rather small and their dynamics is almost flat. Instead, trade is accomplished predominantly along the extensive margin.

If we take our findings one step further, results based on the intensive margin show that choices on traded volumes within existing trade relationships respond less elastically to relative country differences in wages. This finding implies

that deepening production networks—intensifying trade within an already established production network—responds less elastically to relative country differences in wages than location choices that would result in setting up new European capital goods production networks or extending the existing ones. In terms of the investment decisions related to production networks the interpretation of the above findings is straightforward. Investment choices that are made ex ante are strongly affected by relative country differences in wages. Investment choices to deepen already existing production networks that are made ex post depend on wage differences to much lesser extent and, hence, other factors are at play.

Figure 3: How wages affect the margins of trade in parts and components



Conclusion

We provide evidence that trade in parts and components of capital goods between new and old EU countries is driven by relative supply-side country differences. Existing differences in wages across Europe play a prominent role in such trade, and we take our results as evidence for the existence of international East-West production networks in Europe, driven by trade-offs between wages and coordination costs. From the analysis of the two margins of trade we also conclude that wage differences play an important role in the ex ante location investment decision to establish a new production network. However, when production relationships are already established, the ex post decisions to intensify trade within an established partner-product network is based on wage differences to much lesser extent. Other factors of trade across Europe, as shown in Hanousek and Kočenda (2014), surely come into play.

Note

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References

Baldone S, F Sdogati and L Tajoli (2001), "Pattern and determinants of international fragmentation of production: Evidence from outward processing trade between the EU and Central and Eastern European Countries", Weltwirtschaftliches Archiv 137, 1, 80–104.

Chor, D and K Manova (2012), "Off the cliff and back? Credit conditions and international trade during the global financial crisis", Journal of International Economics 87, 1, 2012, 117–133.

Coe N M and H W-C Yeung (2015), Global Production Networks: Theorizing Economic Development in an Interconnected World, Oxford University Press.

Frensch, R (2010), "Trade liberalisation and import margins", Emerging Markets Finance & Trade 46, 3, 4–22.

Frensch R, J Hanousek, and E Kočenda (2015), "Trade in Parts and Components across Europe", Centre for Economic Policy Research, CEPR Discussion Paper 10932, CEPR.

Görg, H (2000), "Fragmentation and trade: US inward processing trade in the EU", Weltwirtschaftliches-Archiv 136, 3, pp, 403–422.

Hanousek J and E Kočenda (2014), "Factors of trade in Europe", Economic Systems, 38(4), 518-535.

Haveman, J and D Hummels (2004), "Alternative hypotheses and the volume of trade: The gravity equation and the extent of specialization", Canadian Journal of Economics 37, 1, 199–218.

IMF (2013), "German-Central European supply chain—cluster report", IMF Country Report No. 13/263, Washington, D.C., August.

Kimura F, Y Takahashi, and K Hayakawa (2007), "Fragmentation and parts and components trade: Comparison between East Asia and Europe", North American Journal of Economics and Finance 18, 23–40.

Kimura F, K Hayakawa and Z Ji (2008), "Does international fragmentation occur in sectors other than machinery?", Asian Economic Journal 22, 4, 343–358.

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